

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

### REMARKS

Reconsideration and continued examination of the above-identified application are respectfully requested.

#### Rejection of claims 5, 16, 19, 21, 28, 31, 33, 39, 42, 44, 51 and 53 under 35 U.S.C. §102(b) over Stalling et al.

At page 2 of the Office Action, the Examiner rejected claims 5, 16, 19, 21, 28, 31, 33, 39, 42, 44, 51, and 53 under 35 U.S.C. §102(b) over Stalling et al. (U.S. Patent No. 5,308,481). The Examiner alleged that Stalling et al. discloses a separation device such as a chromatography device wherein the stationary phase comprises carbonaceous material such as fullerenes having attached at least one organic group such as an aromatic-(C<sub>n</sub>H<sub>n+1</sub>) group [sic]. The Examiner further alleged that Stalling et al. discloses glycol as an organic chemical attached to the carbonaceous material and further discloses that the carbonaceous material can have more than one organic molecule attached. For the following reasons, this rejection is respectfully traversed.

Independent claim 5 is directed to a separation device comprising a mobile phase and a stationary phase, wherein the stationary phase comprises carbonaceous material having attached at least one of the specifically defined organic groups set forth in the claim. As described for example at page 8, lines 22 - 28 and elsewhere in the present specification, the attached organic group affects the adsorbent capacity and selectivity of the carbonaceous material. Contrary to what is alleged by the Examiner, none of the attached organic groups set forth in claim 5 are described in Stalling et al. In particular, the abstract of Stalling et al., referred to by the Examiner, only states that the invention relates to fullerenes covalently bonded to a polymer particle or a

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

siliceous support particle, and col. 4, lines 58 - 66 of Stalling et al. only describes reactive groups such as  $-\text{CH}_2\text{X}$ ,  $-\text{OH}$ ,  $-\text{NH}_2$  and  $-\text{COOH}$  being bonded onto the fullerene to facilitate the attachment of the fullerene to a polymer particle. Figure 10b of Stalling et al. shows a linkage between a fullerene and a polymer particle, but this linkage is not made by a group defined in claim 5. Contrary to what is alleged by the Examiner, an "aromatic- $(\text{C}_n\text{H}_{2n+1})$ " group is not a group that is defined in claim 5, nor is such a group disclosed in Stalling et al. The Examiner seems to intend to refer to the " $-\text{Ar}(\text{C}_n\text{H}_{2n+1})_x$ " group, which is included in claims 5 and 19 (and, by dependency, claims 31, 42, 51, and 53). Stalling et al. does not disclose any such group and, in particular, this group is not the linkage that is shown in Fig. 10b of Stalling et al. The formula " $-\text{Ar}(\text{C}_n\text{H}_{2n+1})_x$ " requires that the aromatic portion of the defined group be attached to the carbonaceous material (since, as noted at page 19, lines 29 - 31, hyphens on one or more ends of a formula indicate the attachment to the carbon product or to another group). Moreover, according to the formula, none of the one or more aliphatic groups that are attached to the aromatic group connect to any other group, but rather, each ends in a methyl group. The linkage shown in Fig. 10b of Stalling et al., on the other hand is a  $\text{C}_8\text{H}_{16}$  chain joined at one end to an oxygen atom bonded to a fullerene and joined at the other end to an NH group of a polystyrene- $\text{NH}_2$  polymer particle. Stalling et al. contains no teaching or suggestion of a carbonaceous material having an aromatic group attached to the carbonaceous material and one or more non-linking aliphatic groups (that is, groups that end in  $\text{CH}_3$ ) attached to the aromatic group, as included in claim 5 and as required by claims 19, 31, 42, 51, and 53. Moreover, Stalling et al. contains no teaching or suggestion of a carbonaceous material with an attached phenyl or naphthyl group having ionic or ionizable groups, as included in claim 5 and as required by claims

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

28 and 39. Moreover, Stalling et al. contains no teaching or suggestion of a carbonaceous material with an attached polyethylene glycol or methoxy-terminated polyethylene glycol or derivatized resins thereof as included in claim 5 and as required by claims 21, 33, and 44. Contrary to what is alleged by the Examiner, this feature is not disclosed at col. 9, lines 10 - 21 of Stalling et al. This passage of Stalling et al. refers to glycol dimethacrylate, triethyleneglycol dimethacrylate and tetraethyleneglycol dimethacrylate as crosslinking agents that are combined with monomers in the formation of a core-shell polymer particle, which is one of the support particles mentioned in the reference. This particular passage of Stalling et al. has nothing to do with fullerenes, but rather relates to the formation of a specific type of particle to which a fullerene may be attached. Stalling et al. contains absolutely no description of a carbonaceous material that has an attached polyethylene glycol or methoxy-terminated polyethylene glycol or derivatized resins thereof. Moreover, since Stalling et al. does not teach or suggest any of the above-described particular organic groups, Stalling et al. would not teach or suggest any separation device containing a second organic group in addition to one of these particular organic groups as required by claims 28, 31, 33, 39, 42, and 44. Therefore, this rejection should be withdrawn.

**Rejection of claims 17, 29 and 40 under 35 U.S.C. §103(a) over Stalling et al. in view of Kusano et al.**

At page 3 of the Office Action, the Examiner rejected claims 17, 29, and 40 under 35 U.S.C. §103(a) over Stalling et al. in view of Kusano et al. (EP 0 300 448). The Examiner acknowledged that Stalling et al. does not disclose an amino type molecule attached to

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

carbonaceous material. The Examiner alleged that Kusano et al. shows the use of an amino type molecule as a separation medium. The Examiner took the position that it would have been obvious to modify Stalling et al. with the teachings of Kusano et al. on the alleged grounds that Kusano et al. teaches the use of amino type molecules in a separation medium for chromatography. For the following reasons, this rejection is respectfully traversed.

As discussed above, Stalling et al. only describes reactive groups as being bonded onto fullerene to facilitate the attachment of the fullerene to a polymer or siliceous particle or the attachment of fullerenes to each other. As discussed, for example, at col. 4, line 50 to col. 5, line 15, of Stalling et al., the chromatographic material of Stalling et al. is a lattice structure of joined fullerenes and polymer or siliceous particles. Therefore, Stalling et al. only describes groups such as  $-CH_2X$ ,  $-OH$ ,  $-NH_2$  and  $-COOH$  that are capable of facilitating the formation of a lattice structure and does not teach or suggest any other use for reactive groups attached to the fullerenes. In particular, Stalling et al. does not teach or suggest any modification of fullerenes with organic groups that affect the selectivity of a chromatographic material and there is no indication that it would even be possible to make a stable modification of this type to a fullerene. Kusano et al. does not overcome the deficiencies of Stalling et al. Kusano et al. describes the use of a coating of an optically active amino acid derivative on a substrate to provide a separation medium for separating racemic mixtures. There is no teaching or suggestion in Stalling et al. or Kusano et al., either singly or combined, that the amino acid derivatives of Kusano et al. would be capable of performing the function of facilitating the attachment of fullerenes to polymer particles to form a lattice structure, or even that the amino acid derivatives of Kusano et al. could be attached to fullerenes at all. Kusano et al. does not teach any attachment of its amino acid

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

derivatives to anything, but rather only describes coating the amino acid derivatives onto a substrate. Accordingly, Stalling et al. and Kusano et al., either singly or combined, do not teach or suggest a separation device comprising a mobile phase and a stationary phase, wherein the stationary phase comprises carbonaceous material having attached at least amino acid or derivatized amino acid, cyclodextrin, immobilized protein, polypeptides, or combinations thereof, as required by claims 17, 29, and 40. Therefore, the rejection should be withdrawn.

**Rejection of claims 18, 20, 22 - 27, 30, 32, 34 - 38, 41, 43, 45 - 50, 52, 54 - 76 and 78 - 79 under 35 U.S.C. §103(a) over Stalling et al. in view of Boes et al.**

At page 4 of the Office Action, the Examiner rejected claims 18, 20, 22 - 27, 30, 32, 34 - 38, 41, 43, 45 - 50, 52, 54 - 76 and 78 - 79 under 35 U.S.C. §103(a) over Stalling et al. in view of Boes et al. (U.S. Patent No. 5,807,494)). The Examiner acknowledged that Stalling et al. does not disclose other types of molecules that can be attached to carbonaceous material. The Examiner alleged that Boes et al. shows the use of a variety of organic groups that are attached to a carbonaceous material. The Examiner took the position that it would have been obvious to modify Stalling et al. with the teachings of Boes et al. on the alleged grounds that Boes et al. teaches the use of other types of organic molecules that can be attached to a carbonaceous material. For the following reasons, this rejection is respectfully traversed.

As discussed above, Stalling et al. only describes reactive groups as being bonded onto fullerene to facilitate the attachment of the fullerene to a polymer or siliceous particle or the attachment of fullerenes to each other. As discussed, for example, at col. 4, line 50 to col. 5, line 15, of Stalling et al., the chromatographic material of Stalling et al. is a lattice structure of joined

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

fullerenes and polymer or siliceous particles. Therefore, Stalling et al. only describes groups such as  $-CH_2X$ ,  $-OH$ ,  $-NH_2$  and  $-COOH$  that are capable of facilitating the formation of a lattice structure. Boes et al., on the other hand, describes carbon black products that have attached organic groups that provide the advantage of increased water dispersibility (see, for example, col. 5, lines 23 - 37 of Boes et al.). Clearly, this objective of providing increased water dispersibility is directly at odds to the objective in Stalling et al. of joining particles together into a lattice. There is no teaching or suggestion in Boes et al. of using organic groups to attach carbon black particles to anything else. Therefore, a person skilled in the art would not be motivated to modify Stalling et al. with the teachings of Boes et al. Moreover, since Stalling et al. does not teach or suggest any other use for reactive groups attached to the fullerenes except for providing the fixation of fullerenes and polymer or siliceous particles and since Boes et al. contains no disclosure relevant to chromatography at all, the motivation described in the present application of affecting the adsorption properties and the selectivity of a chromatographic material by attaching organic groups is not found in either reference, taken singly or combined. Accordingly, Stalling et al. and Boes et al., either singly or combined, do not teach or suggest a separation device comprising a mobile phase and a stationary phase, wherein the stationary phase comprises carbonaceous material having attached thereto the specific groups required by claims 18, 20, 22 - 27, 30, 32, 34 - 38, 41, 43, 45 - 50, 52, 54 - 76, and 78 - 79. Therefore, the rejection should be withdrawn.

### CONCLUSION

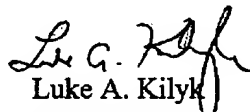
In view of the foregoing remarks, Applicants respectfully request the reconsideration of

U.S. Patent Application No. 09/945,340  
Request for Reconsideration dated December 19, 2005  
Reply to Office Action of August 19, 2005

this application and the timely allowance of the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,

  
Luke A. Kilyk  
Reg. No. 33,251

Atty. Docket No. 96074CIP2 (3600-011-03)  
KILYK & BOWERSOX, P.L.L.C.  
400 Holiday Court, Suite 102  
Warrenton, VA 20186  
Tel.: (540) 428-1701  
Fax: (540) 428-1720